
Stamp Goes Here

Student Notes

Science on Saturday

February 7, 2015

Shale Gas Revolution

Presenters:

Dr. Roger Aines, Energy and Environment Directorate, Lawrence Livermore National Laboratory
Dean Reese, Physics Teacher, Tracy High School

Overview:

The new abundance of natural gas provides energy options for America, including clean electric power. Oil production has increased, reducing the dependence of the US on imported petroleum. Both benefits come with the challenge of managing the environmental impact of new oil and gas development in the US. This talk will discuss the way shale gas and oil are created and produced, and the latest choices now available for generating energy in the United States.

Outline:

1. What units are used to measure energy? How much energy does a AAA battery store?
2. What units are used to measure power? How much power does a spotlight use to generate light?
3. List the metric prefixes for the following values:
 10^3 =
 10^6 =
 10^9 =
4. How much residential power do Americans use throughout the day at home?
5. What are the 3 types of fossil fuels?

6. What is the byproduct of burning fossil fuels (what does burning fossil fuels release into the atmosphere?) and how does it affect the environment?
7. Have CO₂ emissions in the US increased or decreased over the last 5 years? Why is this happening?
8. How is natural gas different from petroleum?
9. List several environmental concerns with fracking (accessing natural gas from underground).
10. What are the benefits of continuing to access natural gas from within our country?

Dr. Roger Aines



Roger Aines is a member of the Energy and Environment Directorate at Lawrence Livermore National Laboratory, where he leads the geochemistry group. Roger holds a Bachelor of Arts degree in Chemistry from Carleton College, and a Doctor of Philosophy in Geochemistry from the California Institute of Technology. Roger's research interests include the in situ degradation of organic chemicals through heating, simulation of steam-driven underground processes in heterogeneous media, and the mechanisms of thermally assisted remediation. A key research area for Roger has been the coupling of active remediation methods to longer-term, self-actuating methods like oxidation and bioremediation.

Dean Reese



Dean Reese has been teaching Physics at Tracy High School since 2002. He received his BA in Physics and Astronomy from the University of Massachusetts. Upon completion of his undergraduate degree, Dean decided to move across the country to California to try his hand at teaching and has been doing so ever since. In 2011, he received his MA in Science Education from WGU. He is very enthusiastic about his profession and enjoys making connections with local scientists. In the summer, Dean works as a Faculty Scholar in LLNL's Education Program. He is also involved in SJCOE's SIMMS Program, an effort to enhance the simulation skills of local secondary math and science teachers. In 2014, Dean achieved National Board Certification in the teaching profession. Prior to becoming a teacher, Dean was a soldier in the United States Army National Guard.